EUROPEAN COMMISSION
European Research Area

The challenge of domesticating bluefin tuna (Project SELFDOTT)

Continuing on the success of the 5th FP research programme REPRODOTT, which was the first ever study of the reproductive biology of the Atlantic bluefin tuna in captivity, and which developed a hormonal method for the induction of spawning, the programme SELFDOTT (From capture based to self sustained aquaculture and domestication of Bluefin tuna, Thunnus thynnus) is implementing the knowledge on the reproduction of bluefin tuna in captivity. It aims at establishing the knowledge-base required for controlled development of eggs, larvae and suitable and environmentally performing feeds.

Background

Tunas constitute the most valuable fishery worldwide, with global catches of 4 million mtn and a value of US$ 6 billion. Fuelled by the increasing demand for this unique fish by the sashimi-sushi market in Japan, Europe and the United States, a “capture-based" aquaculture industry has developed in the Mediterranean Sea over the last two decades, which involves the capture of migrating wild fish and their fattening in floating cages for periods ranging from 2 months to 2 years. The dramatic expansion of this industry is considered a threat to the now heavily over-fished wild stock.

In order to alleviate the pressure on the wild fishery of the bluefin tuna and aid in its conservation, the domestication of this fish and the development of a sustainable aquaculture industry are necessary. This will allow the propagation of this species in captive conditions, through rearing of the larvae and production of juveniles for further grow-out on suitable, scientifically formulated and environmentally performing feeds, as is done successfully in the EU for species such as salmon, sea bass and sea bream. Therefore, there is a great interest in developing captive bluefin tuna broodstocks and larval rearing methods to support the sustainable development of an aquaculture industry. Studying the reproductive biology and larval rearing of this species in captivity would also result in a better understanding of its life history, which is necessary for management of the wild stocks.

The project

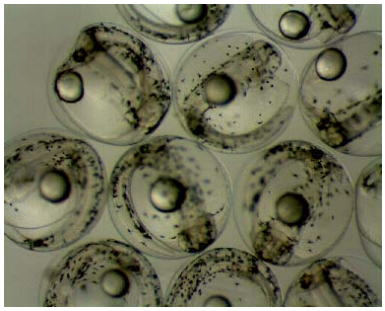
The SELFDOTT project was launched in January 2008 and is funded under the 7th FP Cooperation Work Programme: Food, Agriculture and Fisheries, and Biotechnology. It is coordinated by the IEO, Instituto Español de Oceanografía (SPAIN). The other members of the consortium include the Hellenic Centre for Marine Research (Greece); the Institut Français d’Exploitation de la Mer (France); the Heinrich-Heine University of Düsseldorf, (Germany); the National Centre for Mariculture, (Israel); the University of Cádiz, (Spain); the University of Bari, (Italy); the Malta Aquaculture Research Centre (Malta); the Centre National pour la Recherche Scientifique, (France) and the Université de Montpellier II, (France). The tuna are maintained at the facilities of Ricardo Fuentes Group (Spain) and Malta Aquaculture Research Centre (Malta), who are the industrial partners of the consortium with the Skretting Aquaculture Research Centre, one of the most important fish feed manufacturing company world-wide.

Highlights

Wild broodstocks captured during the 2007 and 2008 fishing campaigns were placed in sea cages in Spain and Malta, and were fed a diet appropriate for supporting reproductive function. These fish were used to study the process of gametogenesis in captivity, in order to identify potential bottlenecks in the process, as well as to examine the influence of diet on reproductive maturation and gamete quality. Mature fish were induced to spawn using hormone implants and the eggs were collected using devices designed specifically for sea cages.

Wild juveniles (0^{+}) were captured alive in Spain by hook-and-line and adapted to captivity in cages in order to establish the knowledge-base required for the development of suitable and environmentally performing feeds.

Since 2009, the bluefin tuna broodstock maintained in Spain produced massive spawnings during the natural spawning season (June-July). The fish were induced with GnRHa implants in 2009 while spontaneous maturation and spawning occurred spontaneously in 2010 and 2011, without the need for exogenous hormonal treatment. Total egg collection was 140 million in 2009, 60 million in 2010 and 160 million in 2011. The Malta broodstock spawned successfully in 2011, after being induced hormonally.



The eggs produced were sent to research hatcheries in Spain (IEO), France (IFREMER), Malta (MARC), Greece (HCMR) and Israel (IOLR-NCM) to carry out the research on the larval rearing and provide the knowledge basis on early stage ontogeny.

The larval rearings carried out in Spain have had the best survival rate, having achieved 73 days in 2009 (30g in weight) and 110 days (100g weight) in 2010. In 2011 thousands of 30 day old juveniles were produced, which were housed in floating cages and were being fed on an artificial diet. At 120 days old they have reached a weight of around 1kg. It is hoped that a good number of these will reach adulthood in a minimum of four years and that they will reproduce, therefore achieving the closing of the biological life cycle of this species in captivity.

For more information, please visit the website:
http://www.selfdott.org

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